

What is claimed:

1. A method of making a strong alumina cement comprising:
  - a. providing a batch of components comprising a transition alumina, water, a cellulose ether binder, and a pH-modifying component;
  - b. mixing the batch components to form a form a substantially plasticized mass; and,
  - c. heating the plasticized mass under moisture-retaining conditions at a temperature and for a time at least sufficient to obtain hydroxylation of the transition alumina.
2. The method of claim 1 wherein the transition alumina is selected from the group consisting of  $\gamma$ -,  $\eta$ -,  $\delta$ -,  $\chi$ -,  $\theta$ -,  $\rho$ -, and  $\kappa$ -aluminas.
3. The method of claim 2 wherein the transition alumina is  $\gamma$  (gamma)-alumina.
4. The method of claim 1 wherein the cellulose ether binder is selected from the group consisting of methylcellulose, hydroxypropyl methylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, methylhydroxyethyl and methylhydroxypropyl cellulose ethers.
5. The method of claim 1 wherein the pH-modifying component is an acid.
6. The method of claim 5 wherein the acid is selected from the group consisting of acetic acid, formic acid, nitric acid and hydrochloric acid.
7. The method of claim 6 wherein the acid is acetic acid.
8. The method of claim 1 wherein the pH-modifying component is a base.
9. The method of claim 8 wherein the base is  $\text{NH}_4\text{OH}$ .
10. The method of claim 1 wherein mixing the batch components includes:
  - a. dry blending the transition alumina and cellulosic temporary binder;
  - b. combining the water and pH-modifying components to form a liquid mixture; and,

- c. mixing the dry blend with the liquid mixture in a mix-muller to obtain a substantially plasticized mass.
- 11. The method of claim 1 wherein the heating step is carried out at a temperature in the range of 50-100°C for a time in the range of 1-300 hours.
  - 12. The method of claim 1 further comprising shaping the substantially plasticized mass into a green preform following the heating step.
  - 13. The method of claim 12 wherein the step of forming the green preform is carried out by extrusion.
  - 14. The method of claim 13 wherein the green preform is a honeycomb.
  - 15. The method of claim 12 wherein the green preform is a pellet-type structure selected from the group consisting of pellets, beads, and the like.
  - 16. A method for making a ceramic honeycomb comprising the steps of:
    - a. providing a batch of components comprising a transition alumina, water, a cellulose ether binder, and an acid;
    - b. mixing the batch components to form a substantially plasticized mass;
    - c. heat-treating the substantially plasticized mass under moisture-retaining conditions at a temperature and for a time at least sufficient to obtain hydroxylation of the transition alumina;
    - d. extruding the heat-treated mass into a green honeycomb preform; and,
    - e. drying and calcining the green honeycomb preform.
  - 17. The method of claim 16 wherein the transition alumina is selected from the group consisting of  $\gamma$ -,  $\eta$ -,  $\delta$ -,  $\chi$ -,  $\theta$ -,  $\rho$ -, and  $\kappa$ -aluminas.
  - 18. The method of claim 17 wherein the cellulose ether binder is selected from the group consisting of methylcellulose, hydroxypropyl methylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, methylhydroxyethyl and methylhydroxypropyl cellulose ethers.

19. The method of claim 19 wherein the acid is selected from the group consisting of acetic acid, formic acid, nitric acid and hydrochloric acid.
20. The method of claim 19 wherein the acid is acetic acid.
21. The method of claim 16 wherein the heating step is carried out at a temperature in the range of 50-100°C for a time in the range of 1-200 hours.